National Aeronautics and Space Administration

goddard tech transfer news

volume 4, number 3 | FALL 2006

on the cover:

Assistant Chief for Information Systems Technology **Julia Loftis** seeks partnership opportunities both to bring innovative technology into NASA and to spin NASA technology out to industry. For instance, the terrain and rovers in Goddard's Mars Environment for Rovers (MERS) facility are available to researchers wishing to partner with NASA. Read about her other technology transfer activities and more inside.

photo credit: Chris Gunn/Ed Henderson

in this issue:

funding opportunities

Partnership Seed Fund

The Innovative Partnerships Program (IPP) at HQ established the Partnership Seed Fund to address barriers and initiate cost-shared, joint-development partnerships, providing "bridge funding" to enable larger partnerships and development efforts to occur.

Goddard's IPP office managed the submission process for the Center, reviewing more than 50 preliminary proposals and then selecting and aiding the development of eight proposals for submission to HQ. "I was amazed at the magnitude of Goddard's response to the Call given the tight time-frame," said **Darryl Mitchell**, who led the effort for Goddard's IPP office. "So many innovators had some very impressive collaborations, and we'll be working with them to further develop these partnerships."

Project Title	NASA Personnel
Development of a Continuous ADR and Integrated Control Electronics	Peter Shirron (Code 552)
Infusing Environmental Knowledge into Decision Support and Planning Tools for Exploration Mission Operations	Julia Loftis (Code 580)
Large Focal Plane Technology for Simultaneous Imaging and Guiding	John Mather (Code 665 & 443) Brent Mott (Code 553)
Lightweight, Cryostable, Low-Cost Mirrors for the Next Generation of Space Telescopes	David Content (Code 551) Douglas Rabin (Code 671) Ron Eng (MSFC) Dominic Benford (Code 665)

Goddard's IPP office congratulates the four projects that received HQ funding (see table). We also offer our sincere thanks to the hard work of the other Goddard researchers who developed full proposals: **Laddawan Miko** (Code 553), **Dan Powell** (Code 540), **Wesley Powell** (Code 564), and **Diane (Betsy) Pugel** (Code 553).

Goddard Tech Transfer News
http://techtransfer.gsfc.nasa.gov

chief: Nona Cheeks
(301) 286-8504
Nona.K.Cheeks@nasa.gov

editor: Nancy Pekar
(919) 960-2541
npekar@fuentek.com

Goddard Tech Transfer News is the quarterly magazine of the Innovative Partnerships Program office (Code 504) at NASA Goddard Space Flight Center in Greenbelt, Maryland. This magazine seeks to inform and educate civil servant and contractor personnel at Goddard about actively participating in achieving NASA's technology transfer goals:

- Filing required New Technology Reports on eNTRe (http://entre.nasa.gov)
- Pursuing partnerships to accelerate R&D
- Finding new applications for space-program technology
- Identifying innovative funding sources
- Communicating partnership opportunities via conferences, workshops, papers, presentations, and other outreach efforts
- Seeking recognition by applying for technology-related awards

Please send suggestions or feedback about *Goddard Tech Transfer News* to the editor.

Other Federal Funding Solicitations

Two military agencies have issued notices for funding of research and development (R&D) projects. Researchers are encouraged to consider whether their NASA mission work overlaps with these solicitations. With some modifications, existing project/proposal summaries (e.g., for IRAD funding) might be submitted as white papers as a first step in pursuing funding from these agencies:

Agency: **DARPA's Defense Sciences Office**

Solicitation: Defense Sciences Research and Technology (BAA06-19)

Relevant areas of interest: New materials, materials concepts, materials processing and devices, and advanced mathematics

Closing date: February 9, 2007 (white papers should be submitted earlier)

More information: http://www.fbo.gov/spg/ODA/DARPA/CMO/BAA06%2D19/listing.html

Agency: **Missile Defense Agency's Advanced Technology Innovation Cell**

Solicitation: Broad Agency Announcement for Advanced Technology (MDA/DV) (HQ0006-06-MDA-BAA)

Relevant areas of interest: Radar systems; lasers and electro-optical systems; integrated active/passive IR sensor systems; computer science, signal and data processing; physics, chemistry, and materials; and mechanical and aerospace engineering

Closing date: July 31, 2008 (white papers must be submitted earlier)

More information: http://www.fbo.gov/spg/ODA/MDA/WASHDC1/HQ0006%2D06%2DMDA%2DBAA/listing.html

If you are interested in submitting a white paper or proposal, please contact ***Nannette Stangle-Castor*** *(919-873-1457; nsc@fuentek.com) of the Goddard's IPP Office.*

NTR Corner

Report your innovations on enTRe (http://entre.nasa.gov). For more information, contact Goddard's IPP office (6-5810; techtransfer@gsfc.nasa.gov).

Technology Title: Neutron Imaging Spectrometer

Inventors: Stanley Hunter (Code 661) and Noel Guardala (Naval Surface Warfare Center)

Case No.: GSC-15024-1

What it is: This neutron "camera" enables remote, real-time detection and source localization of fast neutrons from any direction and over large areas and distances. Low sensitivity to gamma rays and effective neutron background subtraction allow for high sensitivity detection and precise source localization while allowing stand-off detection at distances up to 1,000 meters.

What makes it better: The design allows neutrons to be detected from any direction. Its use of directional information allows very effective background subtraction, and its insensitivity to gamma rays enables accurate detection of fast neutrons at large distances. Furthermore, it can determine the neutron source location to within a few degrees. The instrument can be used as a stand-alone passive imager or with a neutron source for active detection.

How might it be used: The device might be useful in a variety of passive and active neutron imaging applications, including port security, border monitoring, drug enforcement, and landmine and other explosives detection applications; remote sensing and oil discovery; quality control and nondestructive testing and inspection; medical imaging; and crystallography.

Tech transfer status: As prototype development continues, Godddard's IPP office is contacting companies involved in neutron instrumentation or hazardous materials detection to better understand end-user criteria and constraints.

ntr corner/quiz

Test your TTQ*

*technology transfer quotient

Intellectual Property (IP) Protection in Collaborations

IP protection is when a patent or copyright is put in place to maintain NASA's ownership of the inventions, designs, techniques, tools, devices, software, or other innovations.

Questions:

1. ***Can IP protection be lost even though you have reported your technology through eNTRe or by completing NF1679?***

   - [ ] Yes
   - [ ] No

2. ***Is IP automatically protected when you are collaborating with commercial contractors?***

   - [ ] Yes
   - [ ] No

3. ***What about when you're working with other federal laboratories?***

   - [ ] Yes
   - [ ] No

Answers:

1. Yes. Technologies are not automatically patented or copyrighted. Rather, they are evaluated to determine whether IP-protection measures are appropriate. If you present your technology at a conference or otherwise disclose it before NASA has a chance to initiate patent/copyright efforts, the IP protection could be lost. This has negative financial impacts for you and for NASA.

2. No. It is essential that you have the proper agreement (such as a Space Act Agreement) in place that protects both existing IP and the IP that might result from any collaborative research. If your unpatented technology is inappropriately provided to a commercial entity, NASA loses the ability to patent and license it. Note that this also applies to software developments and copyrights. In these cases, a Software Usage Agreement is needed.

3. No. Even if your collaborator is another NASA Center, IP protection can be at risk if technology is shared without the proper agreements in place. Again, this is particularly risky with software. For example, if a software program is provided to researchers at another Center and they don't fully understand its current protection status, they could inadvertently compromise the IP by providing it to someone else. This has happened in the past, and it is detrimental to Goddard and to NASA.

If you want to establish a collaboration or if you are already working with an external partner—be it a company, a university, a not-for-profit organization, another government agency, or even another NASA Center—contact Goddard's IPP office and let us help you get the agreement in place to protect your hard work.

Julia W. Loftis

What have you been doing with Goddard's IPP office?

I have been working with IPP in looking for partnership opportunities both to bring innovative technology into NASA and to spin our technology out to industry.

What kinds of partnership opportunities?

With the help of the IPP, we recently identified an ideal partner—Carnegie Mellon University (CMU)—and successfully collaborated with them on an Applied Information System Technology (AIST) proposal. I do not believe our proposal would have been successful without this partnership and the value that Carnegie Mellon brought to the table. We are very excited about this opportunity to build a relationship with CMU while infusing the technologies of both organizations for an important scientific application.

What technologies are those?

We had developed Adaptive Sensor Fleet software to manage fleets of independent platforms, for example autonomous boats, to collaboratively accomplish a scientific measurement goal. Meanwhile, CMU had developed innovative techniques for "telesupervision," which allows adaptive levels of autonomy in managing such a fleet.

How will these two technologies be used together?

The CMU product was an ideal user interface to our system and represented an area of technology that we hadn't focused on. Under the AIST effort, the two systems will be used to drive a fleet of autonomous boats to study harmful algae blooms (HABs). In this case, the whole will definitely be greater than the sum of the two parts! We look forward to the first demonstration at the end of FY07.

Are you pursuing other partnerships with IPP?

Yes, we are also excited about the partnership with United Space Alliance (USA), which will leverage the strengths of each of our organizations to develop an important system for exploration. *(Editor's note: This partnership received funding through HQ's Partnership Seed Fund, see page 2.)*

What are these respective strengths?

USA is uniquely qualified to operate manned missions and has many employees who do only that. GSFC is uniquely qualified to understand the lunar environment from a scientific and environmental standpoint. Working together, we hope to provide an information system that will make complex scientific information of greatest use in exploration decision making.

photo credit: Chris Gunn

photo credit: Chris Gunn

Code: 580

Years at NASA: 20

Field of Research: Information Systems

Birthplace: Elkins Park, Pennsylvania

Education:

– M.S., computer systems management, University of Maryland University College

– B.A., mathematics (computer science minor), McDaniel College

How have you benefited from your work with IPP?

IPP has been an excellent resource in identifying potential partners, partnering mechanisms, and even funding opportunities. My expertise is in technology development, and I do not have an awareness of these other areas. IPP enables me to focus my time on the technology development aspects, and then they facilitate the spin-in and spin-out processes.

What do you see as the value of technology transfer?

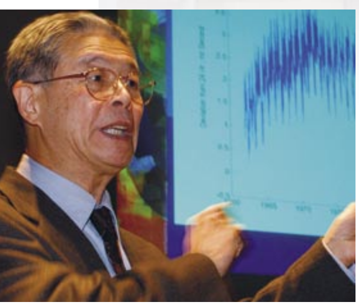
I strongly believe in the IPP mission and its value to the taxpayers. Technology transfer can exponentially increase the value of NASA's investments. If we properly research technology available in industry, we can leverage that rather than building capabilities from scratch. And by developing partnerships, we can bring additional expertise and perspectives in to solve NASA's problems. Lastly, we can benefit the economy and the general public by transferring our technology to commercial applications.

Do you have any advice for your colleagues?

My advice would be to use IPP as a resource. I have found that if I throw a question at them—either regarding what technology already exists, what companies may want to commercialize our technology, or what potential partners have certain skills and capabilities—they are able to spend time doing the research to answer the questions. They can also do much of the ground work for getting partnerships off the ground. I can easily be busy with doing my primary job of developing technology for NASA requirements and not find time for technology transfer. It really doesn't take much time if you share information and questions with IPP and let them help.

Goddard's HHT Helps Scientists Analyze Highway and Bridge Safety

A little more than 3 years ago, Goddard signed an agreement that granted the Federal Highway Administration's Turner-Fairbank Highway Research Center (TFHRC) access to Goddard's Hilbert-Huang Transform (HHT) technology and expert advice from the inventor **Norden Huang** (retired). Since then, Goddard's technology has played a key role in TFHRC scientists' analyses of traffic flow data, wind and traffic interaction with bridges, and damage detection in pavement and bridges. These analyses, which are performed for the Digital Highway Measurement (DHM) Project, are the first steps in a dramatic shift in the way state departments of transportation will be able to improve the safety and performance of the nation's highway infrastructure.



Goddard's Technology

Dr. Huang began developing HHT in 1995 as part of his oceanography research at Goddard. Unlike precursor technologies, HHT provides an effective method for analyzing nonlinear and nonstationary signals while improving the accuracy of linear- and stationary-signal analysis. Because analytical measurements within many areas of science benefit from a quantitative measurement of nonlinear data, HHT is widely applicable to a broad range of fields, including medicine, electronics, the environment, and business. HHT was ideal for structural engineering analyses at TFHRC.

Developing a New Use

TFHRC conducts technology R&D to provide solutions to complex technical problems, thereby enhancing the safety and reliability of the U.S. highway transportation system. Dr. Huang met officials from TFHRC at a seminar, and discussions ensued on the potential use of HHT in highway research. These discussions eventually led to the 2003 agreement developed, negotiated, and administered by Goddard's Innovative Partnerships Program office.

Under the agreement, TFHRC scientists collaborated directly with Dr. Huang to build an operational model of HHT for their own analyses and to build a knowledge base for using the HHT algorithms for the DHM project. This project uses a van driving at highway speeds to collect and analyze critical highway safety data, which can lead to better bridge and highway safety, design, and construction.

"The HHT has been a critical element for accurate analysis of data from some of the sensors on board the DHM van," explained TFHRC's Morton Oskard. "The capability being created in the van represents the beginning of a paradigm shift in the way states will view and be able to carryout their stewardship of the nation's highway infrastructure."

Benefits of Technology Transfer

For TFHRC: As a result of working with Goddard's HHT technology, TFHRC gained the ability to measure highway design performance, rate of deterioration, and remaining life, helping to improve the performance of future highways and bridges. TFHRC will be able to use these findings to improve future highway safety and contribute to improved quality of life.

For NASA: The agreement enhanced NASA's strategic technology objectives. As noted by Dr. Huang, "By sharing the HHT technology with TFHRC, NASA will also benefit by using the resulting knowledge to refine and further develop HHT and its use in other areas of research." For example, stability analyses developed using HHT on vibration measurements at TFHRC are being used to benefit NASA research as well, particularly aero-elastic flight data at NASA Dryden Research Center.

Low-Cost, High-Quality Carbon Nanotubes Enter the Marketplace

University and industry researchers now have access to high-quality single-walled carbon nanotubes (SWCNTs) at a lower cost than ever before. How is this possible? Sold by Idaho Space Materials (ISM) as its NOMEC 1556 product, these SWCNTs are manufactured using a Goddard-developed process.

Goddard's Technology

Although carbon nanotubes were discovered 15 years ago, their use has been limited due to the complex, dangerous, and expensive methods for their production. However, Goddard's **Jeannette Benavides** (Code 562) and **Henning Leidecker** (Code 562) developed a simpler, safer, and much less expensive manufacturing process for SWCNTs. This process's key innovation was its ability to produce bundles of SWCNTs without using a metal catalyst, dramatically reducing pre- and post-production costs while generating higher yields.

Since carbon nanotubes have a wide range of applicability, Goddard's IPP office began promoting the innovative SWCNT manufacturing technology at conferences, in print, and online in the hopes of finding a licensee. The technology caught the attention of Wayne Whitt, who was looking for an innovation with which to start an advanced materials company. Within a year he had founded ISM, and applied for a nonexclusive license for Goddard's technology.

Commercialization

As license negotiations proceeded, Dr. Benavides met with company officials to demonstrate and fully explain the technology. Once the license was signed, she also provided her expertise regarding Raman spectroscopy to researchers at the University of Idaho's Electron Microscopy Center, with which ISM was working on nanotube specimen characterization.

"Dr. Benavides not only worked hard to develop the technology but also was very involved in the technology transfer process," said IPP's **Darryl Mitchell** who managed the development of the license agreement. "Her dedication was essential to the success of this agreement."

Once ISM's production process had been perfected, the company launched its SWCNTs as NOMEC 1556 on August 1, 2006. Product orders have already been received from university researchers, who can purchase ISM's SWCNTs at a reduced price.

"I'm very excited to see that this agreement is now making CNTs more readily available, particularly for academic and other research programs," said Dr. Benavides. "The fact that they now have access to lower cost CNTs bodes well for the future of nanotechnology."

Benefits of Technology Transfer

For ISM: Licensing Goddard's SWCNT manufacturing technology accelerated the launching of ISM and its premier product. "[It] allowed us to begin operations and rapidly commercialize an innovative product without the traditional R&D costs and time," said ISM's Mr. Whitt. "We were able to focus on process enhancement and commercialization, which resulted in significant improvements in yield and production capacity without sacrificing product quality."

For NASA: The out-licensing of its patented technology and ISM's sales of NOMEC products generate revenue for NASA, which can be reinvested in additional space program research. ISM also represents a source for NASA to purchase low-cost, high-quality SWCNTs that could be used in space exploration and science missions.

And Beyond: ISM is making its SWCNTs available to university and not-for-profit researchers at a reduced price. "ISM believes that carbon nanotubes will be a building block for a better world, making people's lives better through a wide range of uses, including medical advances, fuel cells, video displays, solar cells, and a host of other applications," explained ISM vice president Roger Smith. "Getting single-walled CNTs into the hands of researchers will help accelerate their transition from a conceptual idea to a practical product." In addition, ISM is creating high-tech jobs in Boise, Idaho. The company currently employs 8 people and plans to increase the staff to 20 by the spring of 2007.

photo credit: University of Idaho Electron Microscopy Center

The Goddard's Innovative Partnerships Program office is proud to announce the recent signing of eight partnership agreements.

partner	technology/focus	agreement	NASA goals/benefits
Aeroflex, Inc.	SpaceWire	SAA	Commercially available SpaceWire-based ASICs to benefit NASA missions
BCG Wireless	Hilbert-Huang Transform (HHT)	License	Improved signal reception capability in RF devices to benefit NASA's radiometers, telescopes, satellites, etc.
Harris Corp.	SpaceWire	SAA	Increased capability for implementing SpaceWire in commercially available electronics
Howard Community College	Regional academic development	SAA	Market insight on Goddard technologies, potential for future out-licensing
Lake Shore Cryotronics	Multi-stage adiabatic refrigerator (ADR)	License	Commercially available continuous ADRs for infrared detectors and other space-based applications
Maryland TEDCO	Regional economic development	SAA	Access to potential partners for out-licensing Goddard technologies and collaborative R&D
Texas Instruments	Radiation Effects Facility	SAA	Commercially available radiation-tolerant electronics

SAA - Space Act Agreement

Aeroflex, Inc.

This agreement will enable Aeroflex to develop a SpaceWire-based router with guidance from Goddard. The company will translate the multi-port router into application-specific integrated circuits (ASICs), enabling a variety of applications to connect through the router and communicate with each other, benefiting spaceflight applications for both organizations and the aerospace industry as a whole. Specifically, NASA will benefit from being able to purchase ASICs from Aeroflex at a much more affordable rate than producing them in house. Multiple NASA missions may benefit from the ASICs provided by Aeroflex, such as the James Webb Space Telescope, Magnetospheric MultiScale (MMS) missions, and other satellite operations.

BCG Wireless

BCG Wireless has licensed Goddard's Hilbert-Huang Transform (HHT) technology to help improve signal reception capability in radio frequency (RF) communication devices. Initial testing at Goddard indicates that HHT applied to degraded RF signals can significantly reduce the noise in the signal, enabling better reception and more accurate signal transmission. BCG Wireless is looking into the applicability of this HHT capability for devices including radio frequency identification (RFID) chips and cell phone communication systems. BCG Wireless may be able to significantly improve the lifespan and signal reception of a variety of RF devices, including consumer products. NASA also may be able to use enhanced RF capabilities to benefit its own radiometers, telescopes, satellites, and other space program technologies.

Harris Corp.

Goddard is providing support to Harris regarding the SpaceWire standard and the requirements for integrating it into the company's electronics. Once Harris gains familiarity with SpaceWire, the company may go on to build SpaceWire-based electronics, such as those that Aeroflex is developing in cooperation with Goddard (see above). In the future, as such components become more readily available, satellite providers will be more likely to adopt SpaceWire, which will enable faster development of designs at lower costs for NASA and the rest of the aerospace industry. NASA is being reimbursed for Goddard researchers' near-term support to Harris.

Howard Community College

Under this agreement, students at Howard Community College will have the opportunity to gain real-world technology experience as they assess Goddard technologies and collaborate with faculty, Goddard researchers, and local mentors to develop commercialization plans and potential licensing opportunities. This agreement, as well as others previously signed with the University of Maryland–Baltimore County's ACTiVATE program and the University of Baltimore, will enhance NASA's strategic technology objectives, providing Goddard with assessment information about potential applications and licensing opportunities for possible technology transfer efforts.

Lake Shore Cryotronics

The company has licensed a multi-stage adiabatic refrigerator (ADR) technology to manufacture it for commercial availability. This technology enables continuous cryogenic cooling of items to milliKelvin temperatures without the need for liquid cryogens. Licensing this revolutionary technology to a company uniquely positioned to manufacture and market the hardware offers tremendous value both to NASA and to other research organizations. NASA will benefit by being able to purchase the completed CADR units from Lake Shore (for use in infrared detectors and telescopes) at an economical price. NASA's possibilities for CADRs include infrared detectors for monitoring crops, ocean temperature, and atmospheric changes; generation of liquid rocket fuel for Mars exploration; and other detectors. Lake Shore plans to market the CADR units to research labs and universities, helping to further research in low-temperature physics and condensed-matter physics.

Maryland Technology Development Corp. (TEDCO)

TEDCO's mission is to facilitate the creation of businesses and foster their growth in all regions of the state through the commercialization of technology. "TEDCO's mission is closely aligned with our own," said **Nona Cheeks**, chief of Goddard's IPP office. "This agreement allows us to leverage the state's investment in technology-based economic development for the benefit of NASA as well as the state of Maryland." Goddard's agreement with TEDCO is designed to serve as a valuable link between Maryland companies looking to benefit from Goddard's capabilities and technologies. The agreement will enable local industry and universities both to utilize Goddard research and development and to help achieve NASA missions faster and more cost effectively.

Texas Instruments

Texas Instruments will work with researchers at Goddard's Radiation Effects Facility (REF) to test and reengineer electronics that can withstand the effects of radiation in space. The agreement will enable the company to engineer and market radiation-tolerant electronics to serve NASA and aerospace companies that manufacture spaceflight equipment. Goddard also will be able to apply the test data obtained under this agreement to other space electronics, understanding the impact of NASA's current test methodologies on different sizes of instruments.

Out and About with IPP

Goddard researchers and technology transfer personnel participated in two recent events.

NBC4 Connected Expo

Drawing about 38,000 visitors, the NBC4 Connected Expo (Sept. 16–17) provided Goddard with an excellent opportunity to reach the public, sharing the latest technology and detailing the ways NASA enriches lives. In addition to staff from the Public Affairs Office, Goddard's IPP office arranged for the participation of several researchers and their technologies:

- Models of the Martian surface, which were prepared using a software program developed by **John Keller** (Code 691) that allows Mars Orbiter Laser Altimeter topography data to be used by a rapid prototyping machine (see Spring 2006 issue)
- The conformal gripper, which recently won an R&D100 Award (see story at right), and other mechanical technologies developed by **John Vranish** (retired)
- The youth version of the Secure Ambulation Module (SAM-Y), developed by Enduro Medical Technology and based upon technology developed at Goddard (see Summer 2006 issue)

Also on display were technologies supplied by **Ted Swanson** (Code 540). IPP appreciates the participation of all of these individuals.

FLC-MAR Annual Meeting

Goddard IPP chief **Nona Cheeks** shared some "lessons learned" at the 2006 meeting of the Mid-Atlantic Region of the Federal Laboratory Consortium for Technology Transfer (FLC-MAR). Ms. Cheeks presented two case studies to demonstrate how rights to intellectual property (IP)—particularly software—can be lost through interagency sharing and/or collaborative research with commercial contractors. The negative results of losing IP rights include lost revenue for the agency and inventors. The presentation and discussion provided valuable insights on how to prevent such "missed opportunities." In addition to this presentation, Goddard personnel won two FLC-MAR awards (see story at right).

FY06 Ends with Many Awards

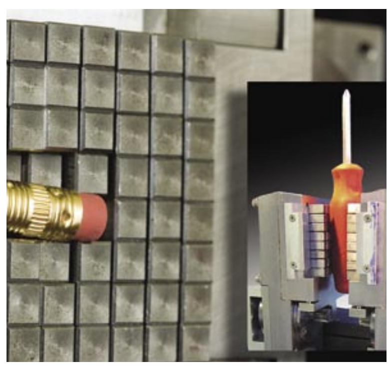
Several Goddard innovators received prominent awards from outside organizations in recent months.

Service to America Medal

Dr. Norden Huang was joined at the Service to America Medal's black-tie ceremony by (l to r) his wife Beeshyn as well as Nona Cheeks and Laura Schoppe of Goddard's IPP office, which led efforts to make HHT available beyond NASA and prepared the award nomination.

As reported in the Summer 2006 issue of *Goddard Tech Transfer News*, **Norden Huang** (retired) had been named a finalist for this award from the Partnership for Public Service. IPP is pleased to announce that Dr. Huang was selected as the winner of the Science and Environmental Medal for his work related to the Hilbert-Huang Transform (HHT) technology. More information on this technology is available online (http://techtransfer.gsfc.nasa.gov/HHT/).

"I am so pleased to receive this award," said Dr. Huang, who is now with the Research Center for Data Analysis at National Central University in Taiwan. "I'm particularly grateful to [the IPP] for seeing the potential for my technology. I have greatly enjoyed seeing HHT make advancements in so many areas."



R&D 100 Award

Called the "Oscars of invention" by the *Chicago Tribune*, this annual award from *R&D Magazine* recognizes the 100 most innovative and technologically significant new products on the market. Goddard's conformal robotic gripper, developed by **John Vranish** (retired) won an R&D 100 Award for 2006.

The technology is a unique gripping mechanism that has the potential to revolutionize robotics by eliminating the need for specialized end effectors and grippers. Originally designed for use in NASA's lunar robotics missions, the gripper has applications in manufacturing, medicine, and other industries that rely on robots to use tools and manipulate objects.

FLC-MAR Excellence in Technology Transfer Awards

IPP is pleased to announce that two technology transfer efforts have been recognized by FLC-MAR:

- Computer Implemented Empirical Mode Decomposition Method, or Hilbert-Huang Transform (HHT), including **Joe Famiglietti** (Code 502), **Norden Huang** (retired), **Keith Dixon** (Code 140.1), **Karin Blank** (Code 586), **Semion Kizhner** (Code 564), **Tom Flatley** (Code 586), and IPP's **Laura Schoppe** (Fuentek)
- Cable-Compliant Joint and Compliant Walker, including IPP's **Darryl Mitchell**, **Wayne Eklund** (Sigma Space Corp.), **Allen Crane** (Swales), and the late **James Kerley**

NASA Inventions and Contributions Board Awards

The following awards were issued by ICB during the fourth quarter of FY06.

Space Act Board Awards

Goddard Mission Services Evolution Center (GMSEC) Architecture by John Bristow (Code 583), Jane Steck (Code 584), James Fessler (Lockheed Martin Space Operations), Robert Zepp (Computer Sciences Corp. [CSC]), Christopher Shuler (CSC), Brian Gregory (Interface & Control Systems), and Danford Smith (Code 581)

GMSEC Message Bus by John Bristow (Code 583) and Arturo Mayorga (Code 583)

Software Release Awards

Distributed Guidance and Control System for Satellite Constellations by Chadwick Cox, Paul Mays, Richard Saeks, and James Neidhoefer (all with Accurate Automation Corp.)

Formation Flying Testbed Software Architecture and Implementation by John Higinbotham, David Gaylor, and Jason Mitchell (all with Emergent Space Technologies)

General Mission Analysis Tool by Edwin Dove (Code 595) and David Folta (Code 595)

(1) HDF-EOS Extractor, (2) HDF-EOX Metadata Updater, (3) Metadata Check, and (4) User Friendly Metadater by Jingli Yang (Earth Resources Technology [ERT]) and Zhangshi Yin (Global Science and Technology [GST])

Integrated Test and Operations System Release 7.3 by Warren Thompson (The Hammers Co.)

Matlab-Code V Toolkit by Mark Wilson (Code 551)

Propellant Slosh Analysis for the Solar Dynamics Observatory by Paul Mason (Code 595) and Scott Starin (Code 595)

Radar Software Library (RSL) by Brad Fisher (Science Systems and Applications Inc. [SSAI]), David Wolff (SSAI), and Bart Kelley (George Mason Univ.)

Toolbox for Automated Registration and Analysis (TARA) by Nathan Netanyahu (Univ. of Maryland), Ezinne Uzo-Okoro (Code 612.2), Jeffrey Morisette (Code 614.5), Jacqueline LeMoigne (Code 588), Peyush Jain (Code 588), and Aimee Joshua (Code 588)

Trending and Plotting System by Robert Sodano (Code 581.1)

XML to ODL Converter by John Bane (GST) and Jingli Yang (ERT)

Tech Briefs Awards

Alignment Cube for Cryogenic, Optomechanical Assemblies by Joseph McMann (Man Tech), Henry Sampler (Code 551.1), and Carl Strojny (Code 551)

Astronomer Proposal Tool by Tony Krueger (Man Tech)

Bumper: Method of Retaining Payload Interior Structure within Its Skin while Allowing Maximizing of Interior's Components by Orville Fleming (Northrop Grumman)

Characterization of the HEFT CdZnTe Pixel Detectors by Peter Mao (California Institute of Technology)

Cloud Micro-Sensors for Application on Small UAVs and Balloons by Paul Lawson (Spec Inc.)

Discussion of Using a Reconfigurable Processor to Implement the Discrete Fourier Transform by Michael White (Code 564)

Earth Observing System Data Gateway (EDG) by Ed Sefert (Code 586), Mark Nestler (Code 586), Mark Solomon (Code 586), and Lorena Marsans (Code 586)

Electric Field Antenna for Solar Probe and Space Missions Exposed to High Photon Intensities within the Inner Heliosphere by Edward Sittler (Code 612.2)

Free Vibration of Square Plate and Poisson's Ratio Measurement at Cryogenic Temperatures by Christopher Hoffman (Code 541), Liqin Wang (Code 541), and Brian Harris (Code 541)

High-Gain, Low-Noise Silicon MCP Technology by Sharon Schib (Nanosciences Corp.)

High-Torque Circular Electrical Connector Tool, EVA Crew Aids and Tools by John Grunsfeld (Johnson Space Center)

Holographic Plossl Retroreflector by Eugene Waluschka (Code 551)

Improvement of MCPs by Coating by David Starikov and Chris Boney (both of Integrated Micro Sensors)

Integrated Modeling Environment by Christopher Holtery (Constellation Software Engineering) and Gary Mosier (Code 592)

Miniature Latching Valve by Glendon Benson (Aker Industries)

Modular Tracking Filter & Tracking Data Source Management Software Library by Raymond Lanzi (Code 598)

Portable Airborne Laser System by Ross Nelson (Code 614.4)

Requirements Tracing on TARGET by Jane Hayes (Univ. of Kentucky)

Tightly Packaged Integral Flexure Mount Design for Cryogenic, Metal Mirrors for Astronomy Instruments by Shelly Conkey (Code 551), Jason Hylan (Code 544), and Sandra Irish (Code 544)

Tree to Graph Folding Procedure for Systems Engineering Requirements by Mark Austin (Univ. of Maryland), Vimal Mayank (Univ. of Maryland), and David Everett (Code 431)

Unitary Graphite Composite Hinge by Peter Rossoni (Code 543), James Sturm (Code 543), and Wes Alexander (Code 543)

Wilkinson Microwave Anisotropy Probe (WMAP) Command & Data Handling Flight Software by Art Ferrer (Code 582.1), Steve Slegel (Daedalian Systems Corp.), and Alan Cudmore (Code 582)

Understanding Technology Transfer

Why is it important?

What are the basics?

What is your role?

Attend IPP's training program for scientists and engineers

check our Web site: http://techtransfer.gsfc.nasa.gov

or

contact: Dale Hithon • 6-2691 • Dale.L.Hithon@nasa.gov

Tech Transfer Metrics *(continued from page 12)*

Space-based Ethernet Protocol Embedded in an IPDR Modular Avionics Architecture by Microsat Systems

Spaceflight Ka-Band High Rate Rad-Hard Modulator by Jeffrey Jaso (Code 567)

Spaceflight X-Band Hybrid Phase-locked Oscillator by Jeffrey Jaso (Code 567)

Swift Burst Alert Telescope (BAT) Engineering Flight Software by Microtel LLC

Systems Engineering Process Realization Toolkit* by Emergent Space Technologies

Tangential Jet Evaporator for Two-Phase Cooling of High Flux over Large Areas by TTH Research

Thermal Mechanical Chemical Induction of Vaporization and Combustion by MAS

Toroidal Vortex Combustion by MAS

Trajectory and Performance Models for Earth and Planetary Balloons (Navajo)* by Global Aerospace Corporation

Tunable, High Power Fiber Optic Laser for Lidar Applications by Sigma Space Corporation

Ultra-Compact High-Definition Hyperspectral Imaging System by Flight Landata

Wireless Sensor Network Node* by Vexcel Corporation

Issued Patents: 1

U.S. Patent No. 7,095,379: Radio Frequency Component and Method of Making Same by Mark Pryor (Composite Optics, Inc. [COI]), John Marks (COI), Patrick Bonebright (COI), Kenneth Segal (Code 543), and Alan Kogut (Code 665)

Patent Applications: 17

Provisional Patent Applications: 3

For more information:

- Go to the Awards page in the "News and Events" section of IPP's Web site (http://techtransfer.gsfc.nasa.gov)
- Contact the Award Liaison Officer: Dale Hithon (6-2691; Dale.L.Hithon@nasa.gov)

Tech Transfer Metrics July 1, 2006 to September 30, 2006

New Technology Reports: 92 *Software approved for release

3D Antenna Array and GPS Receiver for Combined Navigation/Attitude Determination Phase II by NAVSYS Corporation

4x4 Individually Addressable InGaAs APD Arrays Optimized for Photon Counting Applications by Adtech Optics

Advanced Adiabatic Demagnetization Refrigerator Integrated Controller by Lake Shore Cryotronics

Advanced Solid State Recorder Scheduling Tool (ASSET)* by Aquilent

Analytical Particle Biogeochemical Sensor by Wet Labs

Annular Ring Premix Injector with Bladder Attachment by Micro Aerospace Solutions (MAS)

Application of SAE Architecture Analysis and Design Language (AADL) to IV&V of NASA Flight Projects by L3 Communications and GSI

Automated Vortex Detection* by Virginia Kalb (Code 614)

Bi-Propellant for Thermal Mechanical Chemical Induction of Vaporization and Combustion by MAS

CCSDS Image Data Transcoding* by Cybernet Systems Corporation

Circuit for Real-time Enhancement of GaN UV Photodetector Quantum Efficiency by Consultant to Zaubertek

Coating Process for Silicon Carbide Fibers by Drexel Univ. and Univ. of Illinois-Chicago

Commercial GIS Extension for Visualization of Large Unstructured Geospatial Data* by ProLogic

Common Data Format* by Raytheon

Compliant Mount for Umbilical Separation Connector by Swales Aerospace

Computer Code to Model Loop Heat Pipe Transients* by TTH Research

Control Center in the Classroom (CCC)* by Ben Lui (Code 584)

Cool-RAD™ Ultra Low Power Cache Random Access Memory Structure with Enhanced Single Event Radiation Tolerance by PicoDyne

Cryogenic Frost Point Hygrometer by Univ. of Colorado

Cryogenic Loop Heat Pipe for Large-Area Cryocooling by TTH Research

Device for Live-Axis Turning for the Fabrication of Non-Rotationally Symmetric Optics by Precitech

Direct Solve Image Based Wavefront Sensing* by Richard Lyon (Code 606)

Dual Concentric Bladders for Positive Expulsion of Gelled Propellant by Micro Aerospace Solutions

Extended Range Displacement Sensor by Bauer Associates

Fabry-Perot Double-Cavity Optically Controlled Narrow Tunable Bandpass Filter by New Span Opto-Technology

Fast Picometer Mirror Mount by Mide Technology Corporation

Fiber-Optic Shape Sensing for Intelligent Solar Sail Deployment by Luna Innovations

Field Programmable Processor Array by Univ. of Idaho

Fluorinated Suspension Medium and Propellant Based Thereon by MAS

Full-Disk Rationing Radiometer to Augment Calibration of the Advanced Baseline Imager by Swales Aerospace

Gas Generator Propellant for Thermal Mechanical Chemical Induction of Vaporization and Combustion by Micro Aerospace Solutions

Gellant for HAN Oxidizer by MAS

GES-DISC Interactive Online Visualization and Analysis Infrastructure (Giovanni)* by Raytheon

Hard Seat Isolation Valve for Spacecraft Applications by Gary Davis (Code 597)

Helium Loop Heat Pipe for Large-Area Cryocooling by TTH Research

High-Power Electro-Optic Modulator for Space-Based Applications by ADVR

High-Resolution X-Ray Collimators by Miko Systems

Horizon Sensor Microsystem with MEMS Linear Scanner by Siimpel Corporation

***In Situ* Lidar for Cloud and Aerosol Radiation Sciences** by Spec

InGaAsP Avalanche Photodetectors for Non-Gated 1.06 µm Single Photon Counting by Princeton Lightwave

Integrated Antenna Array with Individual MEMS Switch Based Modulation by WaveBand Corporation

Integrated Hydrostatic Journal Bearing by Atlas Scientific

Integration of Garnets and Magnets for Waveguide Isolators by Boston Applied Technologies

Land Information System Software, Ver. 4.2* by Univ. of Maryland–Baltimore Co.

Large Depth-of-Field Particle Image Velocimeter by Brent Bos (Code 551)

Lightweight Cryogenic Radiator by Energy Science Laboratories

Low-Cost Al/Diamond Composites for Thermal Management Applications by Materials and Electrochemical Research Corporation

Low-Power Mass Spectrometer Employing TOF by Space Instrument

Magneto-Optic and Electro-Optic Heterostructures by Boston Applied Technologies

Magneto-Optic Garnet Films by Boston Applied Technologies

MEMS-Scale Power System for Microsatellites by TPL, Inc.

Mercuric Iodide Anti-Coincidence Shield for Gamma-Ray Spectrometer by Photon Imaging

Method for Controlled Adhesive Attachment Using an Electrically Activated Viscoelastic Semiconductor by Loats Associates

Methodology for Fixed Point Computational Data Path Optimization by Univ. of Idaho

Micro-Channel Embedded Pulsating Heat Pipes (ME-PHPs) by The Peregrine Falcon Corporation

Microchip Cooling Device with Diamond Heat Sink by Diamond Materials

Miniature Loop Heat Pipe with Multiple Evaporators and Condenser by TTH Research

Miniaturized Instrument to Obtain Atmospheric Profiles of NO, NOx, and NOy by Sonoma Technology

Mirador: A Fast, Minimalist Search Tool for Remote Sensing Data* by SSAI

Multiple Purpose Gas Generator by MAS

NASA Forecast Model Web Map Service (NFMW)* by Jeff De La Beajardiere (Code 610)

Natural Light Polarimeter by Lynntech

Novel Method and Device for Stroke Prediction by Univ. of Idaho

Novel Tunable Dye Laser for LIDAR Detection by Scientific Solutions

Novel FPGA Readout Integrated Circuit (ROIC) Architecture for Geiger Photodiode Arrays by Apeak

OASIS: A Reusable, Autonomous Ocean-Atmosphere Sensor Integration System* by Pacific Gyre

Otoacoustic Protection in Biologically Inspired Systems by Mike Hinchey (Code 581) and Roy Sterritt (Univ. of Ulster)

Passive Non-Rocking Vibration Isolation System by CSA Engineering

Personalization and Flexible Rich Media Content Amalgamation to Existing Streaming Infrastructures* by Sorceron

Pixelized Device Control by QorTek

Practical Model Checking to Enforce Domain Specific Interfaces (CI04)* by SAIC

Predictive Model for Return on Investment of Independent Verification and Validation* by Titan Systems

Pre-Injection Mixing of Gelled Propellants by MAS

Programmable Digital Controller by Michigan Aerospace Corporation

Radiation-Tolerant Space-Wire-Compatible Switching Fabric by Advanced Science and Novel Technology

Robustness of Favorite Controllers by Eddie Akpan (Code 544)

Rollatruss: Flexure-Hinged Optimized Ultralight Deployable Truss Boom with Flattenable Constituent Truss Elements by ATK Space Systems

Rover Radar for Surface Navigation, Hazard Detection, and Negative Obstacle Avoidance by Epsilon Lambda Electronics

Solid-State Spectral Light Source System by HOBI Labs

Space Operations Learning Center Website* by Swales Aerospace

(continued on page 11)